

Preoperative Optimization and Outcome of Diabetic Patient Undergoing Major/Minor Surgeries at Tertiary Care Hospital

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ABSTRACT

Objective: The aim of our study is to see the effect of controlled diabetes done preoperatively as well as postoperatively done so that the fear of complications in minds of diabetic patients should be removed.

Study Design: Cross sectional study

Place and Duration of Study: This study was conducted at Surgical department, PMCH Nawabshah from June 2016 to June 2018.

Materials and Methods: This study included patients suffering from Diabetes Mellitus and also diagnosed diabetes after admission in surgical wards. They were admitted electively through OPD and blood sugar along with HbA1c was obtained in order to commence the treatment of D.M. The patients were shifted from oral anti-hyperglycemic drugs to insulin used subcutaneously or intravenous. Only the patients with controlled diabetes were operated and outcome was assessed.

Results: This is a study of 110 patients. Of 110, 85 (77.27%) were already diagnosed diabetic patients under oral therapy and 25(22.72%) were labeled as diabetic during preoperative preparation of the patients. They were operated for different surgical procedures for multiple elective cases diseases like inguinal hernia, Ventral hernias, Goiter, hemorrhoids, chronic fissure in ano, low type fistula in ano, laparoscopic/open cholecystectomy and for colonic masses. Postoperatively, the blood sugar level of all patients were accurately assessed and monitored and outcomes were observed. 20 (18.18%) patients developed infected wounds, 10(9.09%) went into Paralytic Ileus, 3(2.72%) presented with subcutaneous Hematoma, 1 (0.9%) was readmitted with burst abdomen and 1 (0.9%) developed sepsis. All were treated accordingly and no expiry was seen.

Conclusion: In summary, it can be concluded that the control of Diabetes Mellitus prevents patients from developing postoperative fatal complications.

Key Words: Diabetes Mellitus, Ventral Hernia, Cholecystectomy, Paralytic Ileus, Infected Wounds

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INTRODUCTION

Now days, Diabetes mellitus prevalence is among 30.3 million people in America. According to an estimation, 25% diabetic patients undergo surgery. Diabetes poses patients to postoperative complications like wound infection, M.I, acute renal failure, ileus and prolonged hospital stay. Diabetic persons are 1.5 times more vulnerable to develop wound infections postoperatively

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whose cost is estimated from seven to eight thousand dollars.^{1,2} The pathophysiology of hyperglycemia and its direct effect on surgical results is complex. The response of body to surgical stress results in decreased insulin, increased glucose and osmotic diuresis. These can result in preoperative ketoacidosis/hypermolar syndrome. There occurs the release of stress hormones like epinephrine, cortisol, nor epinephrine, glucagon, and growth hormone. The increased concentration of glucose in blood badly affects leucocytes function and impairs healing of wound.³

Diabetic patients operated for major surgeries are vulnerable to complications of surgery as compared to non diabetic ones. Major procedures require strong management of diabetes mellitus pre operatively. Patients are not put on oral anti diabetic therapy.⁴ The surgical trauma is itself stress that disturbs the body's metabolic system causing alterations in glucose level which eventually produces disruption in normal function of endothelium, sepsis postoperatively, poor

wound healing and ischemia of cerebrum. The disturbed metabolism can also lead to diabetic ketoacidosis and hyperglycemic hyperosmolar syndrome at the time of surgery or postoperatively. The prognosis is grossly affected in these conditions.⁵ Moreover, the anesthesia, drugs, and stress related vagal overlay cause dehydration due to nausea and vomiting. These all along with osmotic diuresis can lead to acute renal failure owing to ischemia. Severe hypokalemia can pose middle aged or old age diabetic patients to an arrhythmia.^{6,7} Therefore it is necessary to pay careful attention to metabolic changes of Diabetic patients who undergo minor to major surgical procedures. Elective surgery must be postponed till the diabetes is not under control. They are admitted in hospital 1 to 2 days before surgery. Even emergency surgery can be delayed if the condition of the patient allows.⁸

The actual treatment suggested should always be based on diabetes classification, nature and extent of the surgery and the experience of the surgeon. Preoperatively, electrolyte imbalance, hyperosmolar state and ketoacidosis should be closely monitored. Daily monitoring should be done. The management in surgical patients for major surgeries always requires insulin therapy with glucose and potassium infusion. Type 2 diabetes for minor procedures are managed on the daily diet, glucose control, type of procedure and expertise.⁹ Regarding the insulin therapy, patients on long acting insulin should be switched to intermediate acting insulin 48 hours before surgery. Intravenous insulin/glucose/potassium should be started prior to surgery. During surgery, blood glucose should be monitored hourly and immediately after surgery. When patient is allowed orally, insulin infusion should be stopped and routine insulin treatment should be started subcutaneously.¹⁰

For major elective surgery, patients are admitted 2-3 days before procedure. Insulin infusion is started to control the glucose level. Preoperative assessment should include physical examination, serum electrolytes, creatinine and urine ketones. In case of diabetic complications, they are treated accordingly before surgery.¹¹ The rationale of our study is to manage metabolic control through monitoring, replacement of fluid and protein and appropriate use of insulin so that diabetic complications of surgery should be prevented from economic burden and psychological trauma to patients.

MATERIALS AND METHODS

All the patients were taken from surgical OPD and emergency department of PMCH Nawabshah. Total 110 were included in this study that was operated for minor to major surgical diseases. Detailed history and thorough clinical examination was done to prepare the patient for surgery. Duration of diabetes and its control

was also asked from the patient. Examination of eye, kidney and nervous system was done specifically to find out any complication of Diabetes Mellitus. All routine investigations were done particularly HbA1c to see the control of the disease. The blood glucose level was fixed from 80 to 180 mg/dl in pre operative period. The level of HbA1c was kept 5 or less than 5 for surgery to be done. All patients were treated accordingly keeping in view the status of blood sugar level and timing of surgery. Patients on oral therapy was switched off and shifted to insulin. Diet control was started. Insulin 70/30 or Insulin Regular subcutaneous was started and glucose level was closely monitored 1/4/6 hourly. Critically ill patients were kept on insulin infusion. Per-operatively, insulin infusion was started, continued postoperatively and shifted to subcutaneous insulin when patient was allowed orally. On the day of discharge, patient was advised on oral therapy.

RESULTS

This study was done for 2 years. It included 110 patients and lasted from June 2016 to June 2018. All the patients were admitted in surgical department of PMCH Nawabshah. Of 110, 85 (77.27%) were known cases of Diabetes Mellitus and 25(22.72%) were diagnosed after screening in surgical wards.

These patients were operated for different surgical procedures for multiple diseases. Of all, 25 (22.72%) were operated for inguinal hernia with Darning Repair, 25(22.72%) for Ventral hernias, 13(11.81%) for Goiter, 20(18.18%) for hemorrhoids, chronic fissure in ano, low type fistula in ano, 20(18.18%) for laparoscopic/open cholecystectomy and 7(16.36%) patients were operated for colonic masses (Table No.1). Postoperatively, the blood sugar level of all patients were acutely assessed and monitored and outcomes were observed. 20 (18.18%) patients developed infected wounds, 10(9.09%) went into Paralytic Ileus, 3(2.72%) presented with subcutaneous Hematoma, 1 (0.9%) was readmitted with burst abdomen and 1 (0.9%) developed sepsis. All were treated accordingly and no expiry was seen (Table No.2).

Table No. 1: Diagnosis

S.No	Diagnosis	Patients included	% of patients
1	Inguinal hernia	25	22.72%
2	Ventral hernias	25	22.72%
3	Lap/open Cholecystectomy	20	18.18%
4	Anal surgery	20	18.18%
5	Goiter	13	11.81%
6	Colonic Masses	7	16.36%
Total		110	100%

Table No.2: Complications

S.No	Complications	Patients affected	% of patients
1	Infected wounds	20	18.18%
2	Paralytic ileus	10	9.09%
3	Hematoma	3	2.72%
4	Burst abdomen	1	0.9%
5	Sepsis	1	0.9%
Total		35	31.79%

DISCUSSION

Hyperglycemia either due to D.M or Stress is the major risk factor causing postoperative disturbances in multiple systems of the body. There is authentic evidence that postoperative outcomes can be modified if hyperglycemia is controlled before surgical admission.¹²

The prevalence of diabetes is increasing rapidly. Recently, International Diabetes Federation unveils that the number of diabetic patients throughout world is 425 million that is 1 in 11 adults in proportion. This number is estimated to increase to 700 million by 20145. Type 2 D.M is common among these people. Patients with D.M have longer hospital stay, increased complication rate, postoperative close monitoring, increased ventilation and higher mortality rate. In our study, only 10(9.09%) persons had prolonged hospital stay due to development of paralytic ileus. The mortality rate in our study was negligible.¹³

The prevalence of D.M in USA is 9.3% of total population. Of them, 27% were undiagnosed. In our study, 77.27% were known cases and 22.72% were undiagnosed. WHO estimations are that 347 million people are suffering from D.M in the globe. From 2010 to 2030, 69% increase in Diabetic patients will be in developing countries and 20% increase in developed countries.¹⁴ Recent study found that the ratio of HbA_{1c} <6.5% or >9.0% are associated with increased mortality in year in case of type 2 D.M. Therefore, pre operative optimization of diabetic patient is essential to prevent complications. Non optimized patients commonly develop neurological complications somnolence, unconsciousness and seizures leading to death. Studies suggest that hypoglycemia increases complications and expiry ratio of critically ill patients.¹⁵ Studies have shown that complications in surgical wounds are common in uncontrolled diabetes. This is also shown in our study in which infected wound is the commonest complication. 18.18% persons developed infected wound. The results are similar in controlled diabetic and undiabetic patients.¹⁶

Several studies have proved the relation between elevated HbA_{1c} and postoperative adverse outcomes. Other studies have also detected inter relation between elevated pre-operative blood sugar level and death ratio. In our study, this inter relation is also proved with extreme control of blood glucose level pre operatively

and postoperatively.¹⁷ Statz et al and other studies reported greater risk for acute renal failure and postoperative infections. They suggest that hyperglycemia causes surgical site infection and delay in wound healing. In our study, SSI is also the major complication because of fluctuation in glucose level in blood postoperatively owing to surgical trauma and natural response of body to that stress. Obese diabetic patients are at increased risk of cardiovascular accidents during or after surgery. In our study, no such incident was noted.^{18,19}

CONCLUSION

To sum up, it is found that preoperative optimization of diabetic patient for either minor or major surgeries produces good results with least complications and surely protects persons from life threatening outcomes.

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